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(71) Applicant(s)

Motorola Inc

(Incorporated in USA - Delaware)  
Corporate Offices,  
1303 East Algonquin Road, Schaumburg,  
Illinois 60196, United States of America

(72) Inventor(s)

David Ronald Bourne  
Genevieve Conaty  
Richard Houghton  
John Richard McCardle

(74) Agent and/or Address for Service

Colin Treleven  
European Intellectual Property Department,  
Midpoint, Alencon Link,  
BASINGSTOKE, Hants, RG21 7PL,  
United Kingdom

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(56) Documents Cited  
GB 2315186 A JP 030280190 A

(58) Field of Search  
ONLINE: EPODOC, WPI, JAPIO

(54) Abstract Title

Modular portable communication terminal and module for use therein

(57) A modular system for portable multimedia communications terminal (100) has modules (110, 140, 150, 160, 170, 180, 190) that can be detachably attached together and can rotate with respect to each other and rest at any angle, so that they can be arranged in a 'chain' arrangement or as a 'fan' or in any combination. There is no set limit to the number of multimedia communication modules that can be stacked together. The modules can be arranged in any order or configuration as desired by the user. This provides the advantages that: the combination of stacking and swivelling allows the device to have both compactness for portability and more "real estate" for usability; the user can choose which functionality the communication device will need to have and choose the modules (to purchase or to take out for the day) accordingly; and the keyboard modules (160, 170) 'fan' out to give a larger alpha/numeric keyboard/keypad size to increase usability.

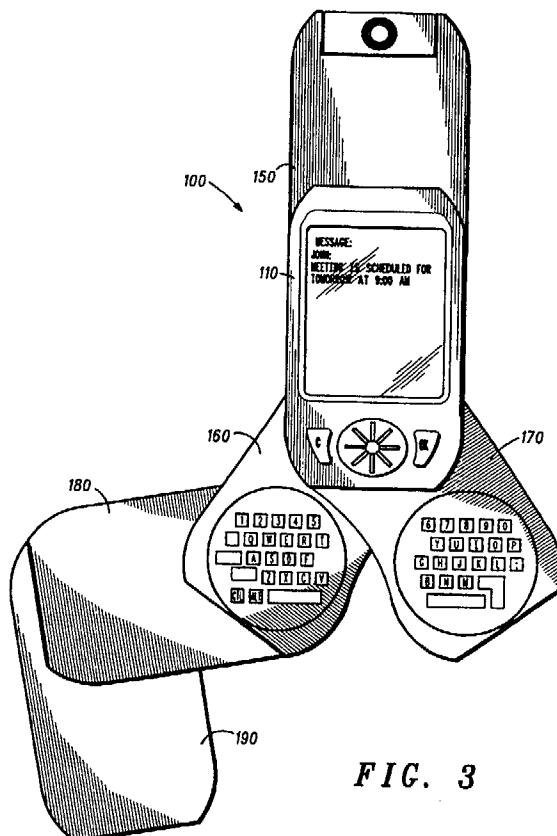


FIG. 3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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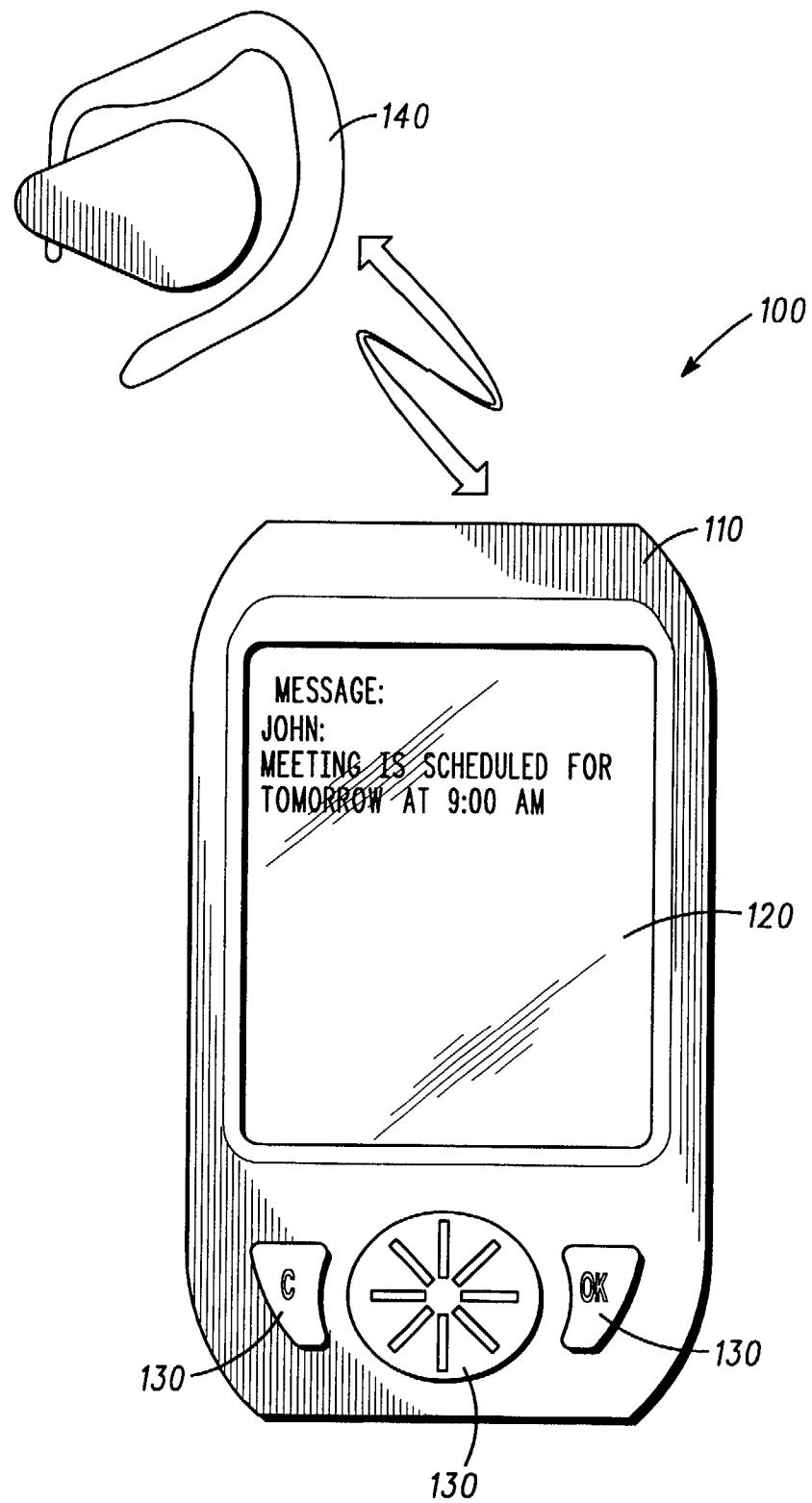


FIG. 1

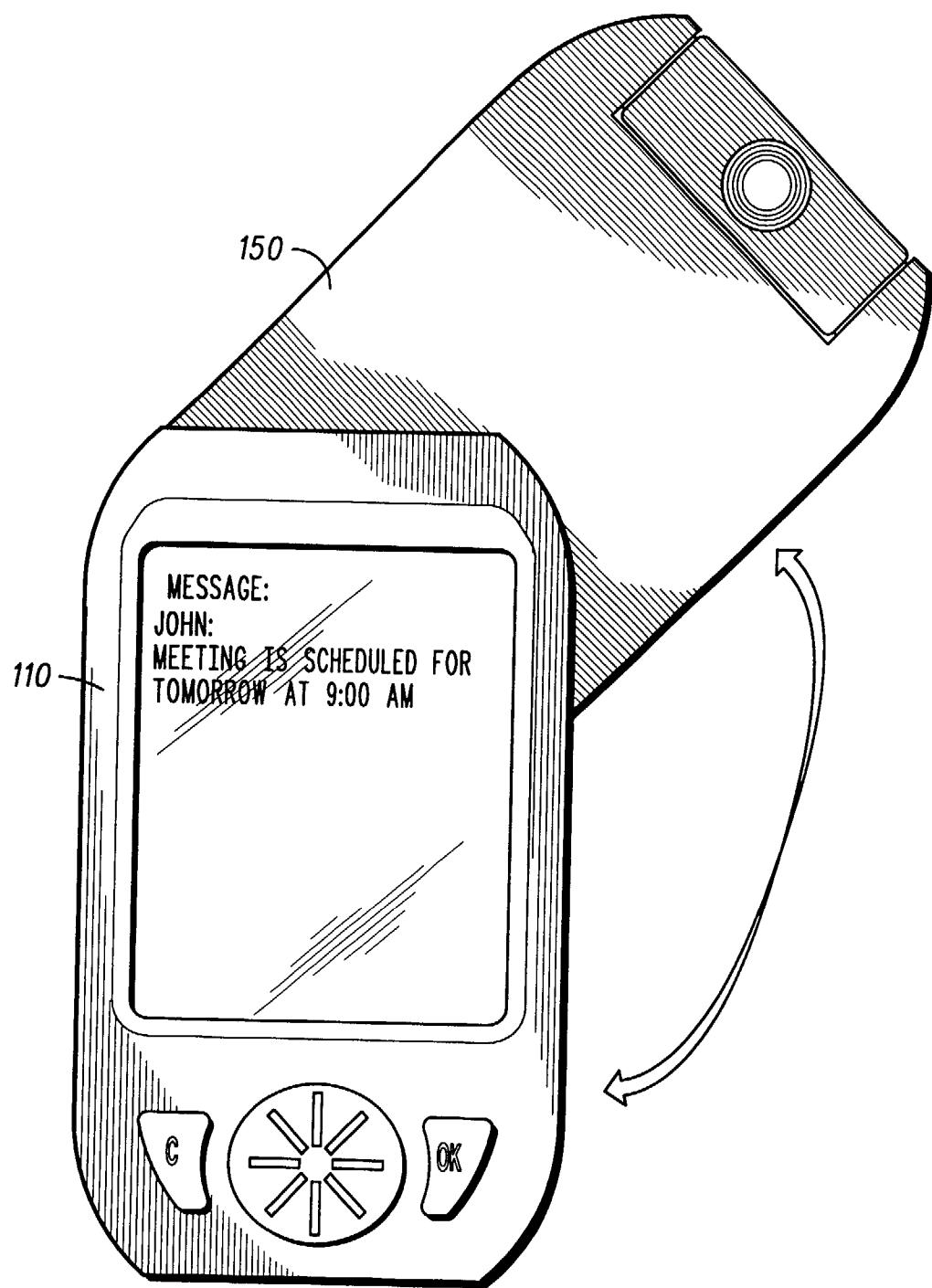


FIG. 2

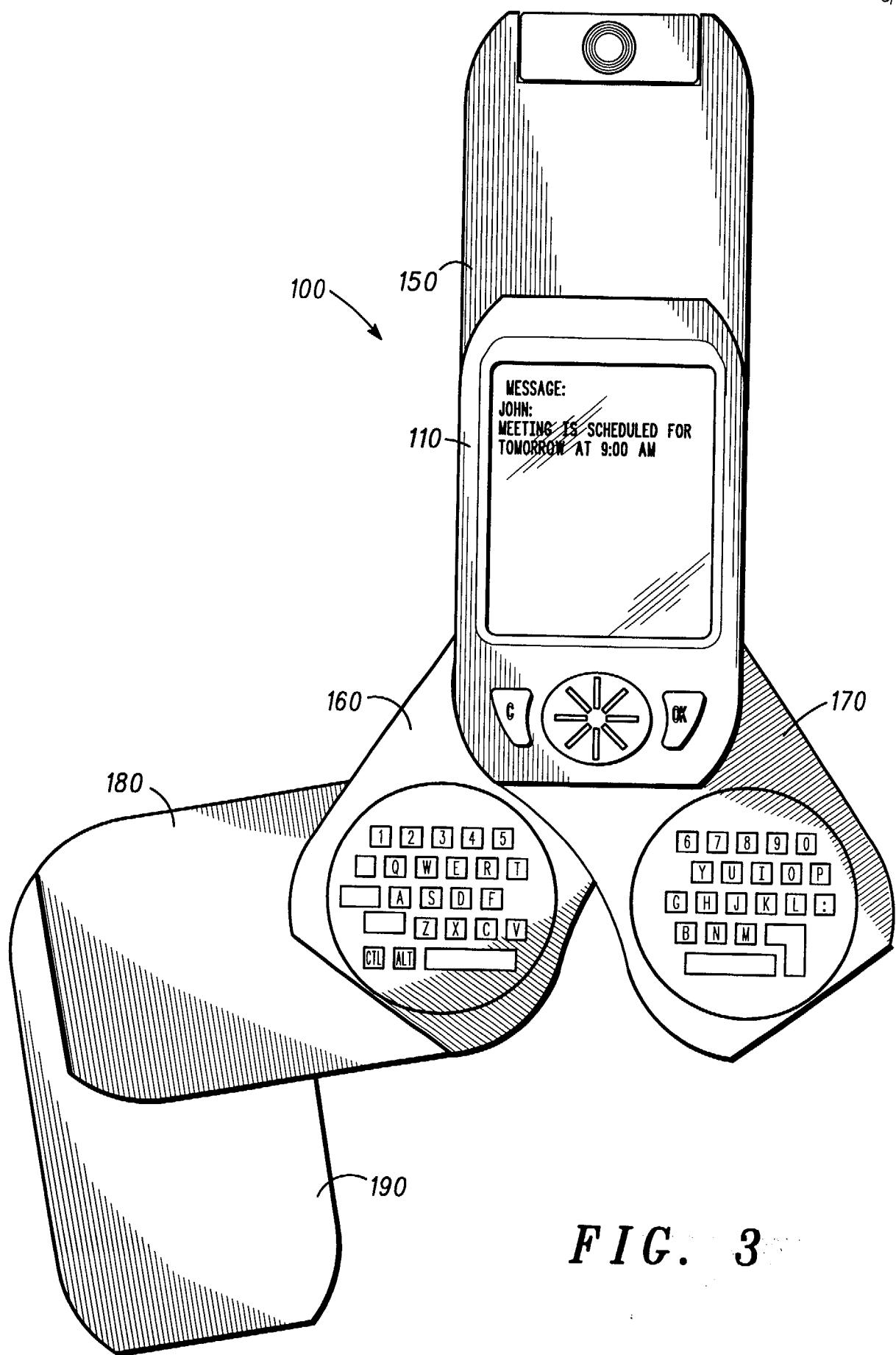


FIG. 3

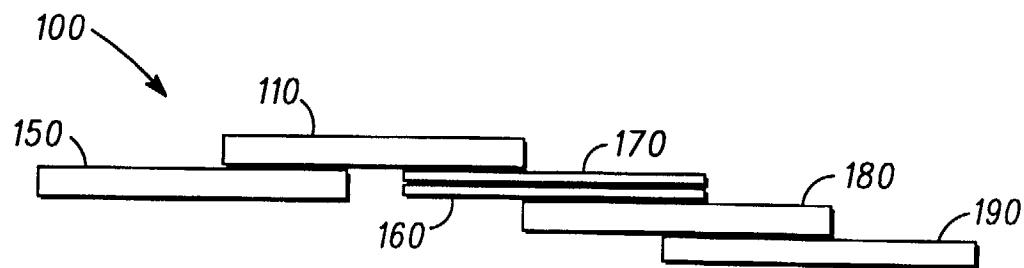


FIG. 4

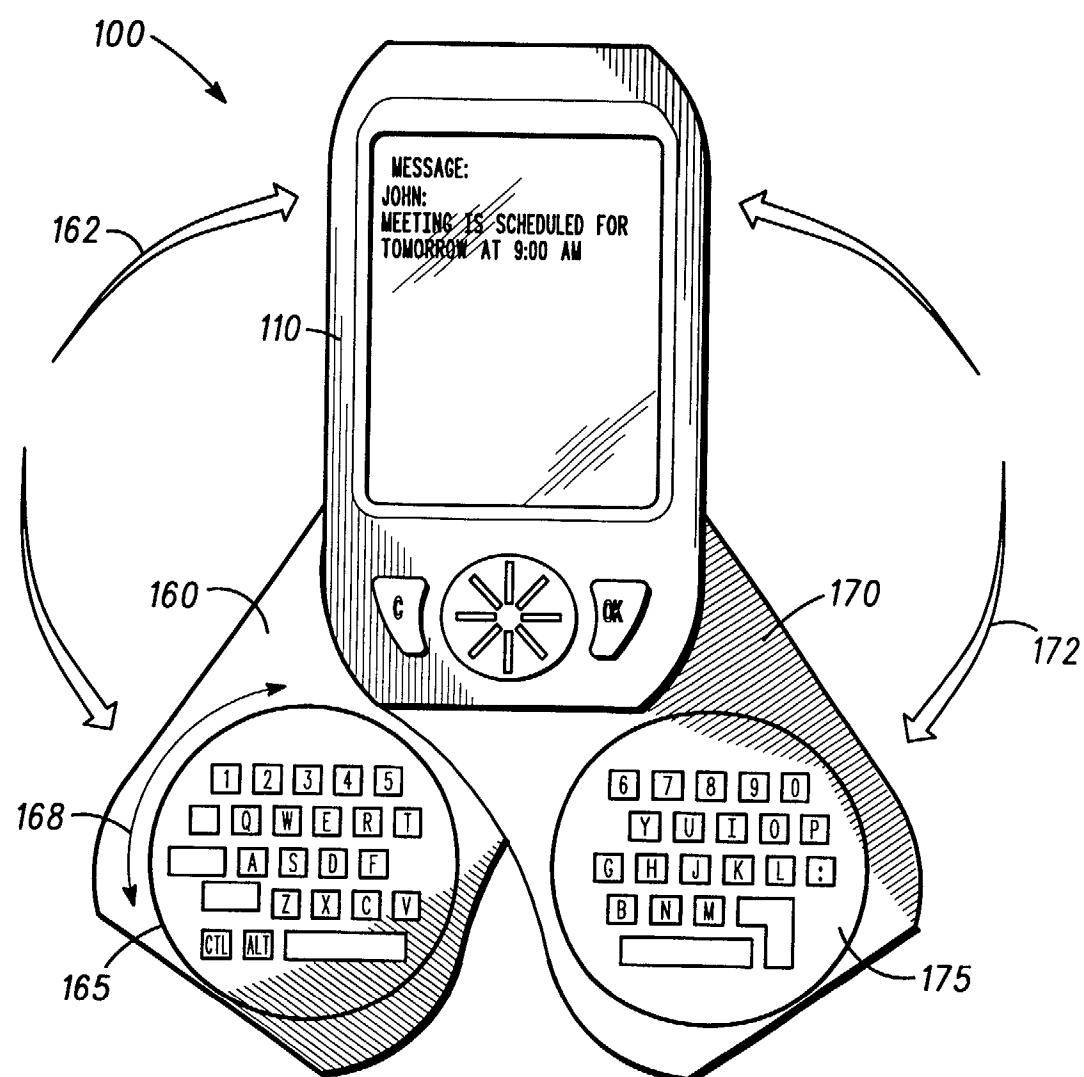


FIG. 5

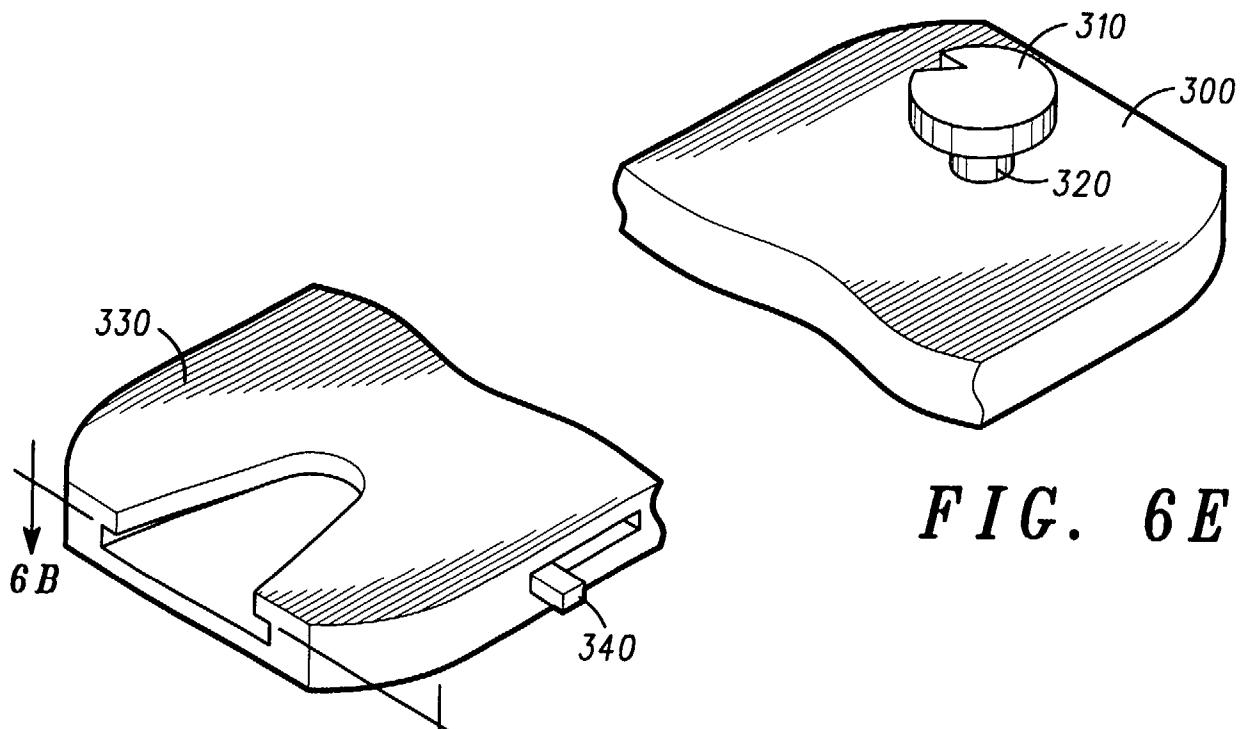


FIG. 6A

FIG. 6E

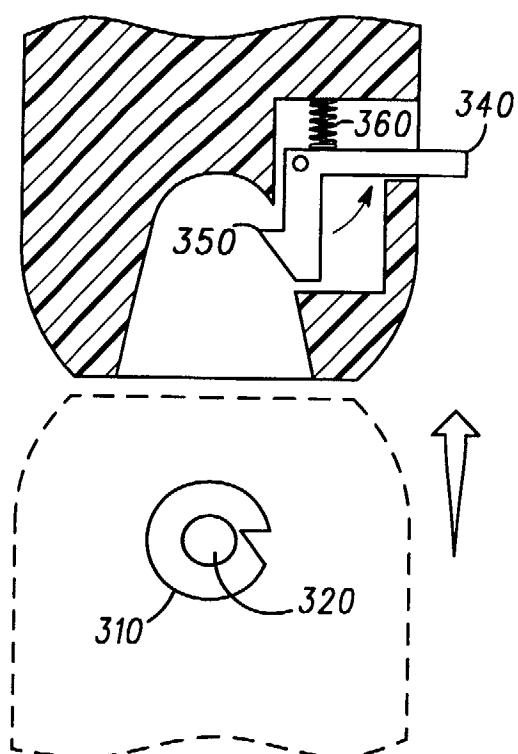


FIG. 6B

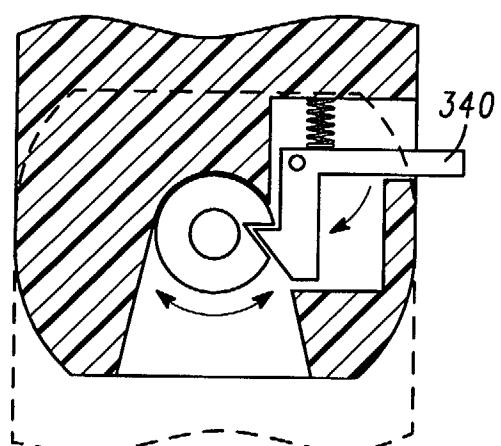


FIG. 6C

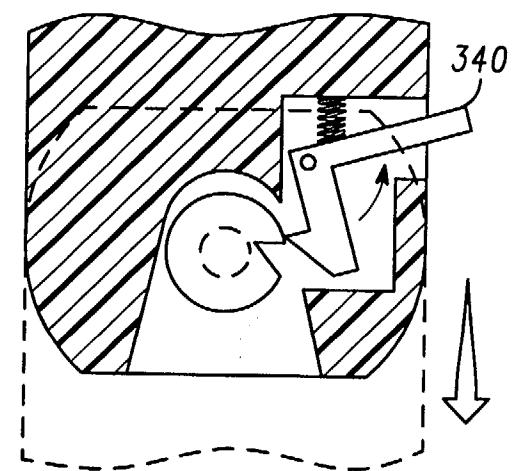


FIG. 6D

Modular System For A Portable Communication Terminal And  
Module For Use Therein

Field of the Invention

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This invention relates to a modular system for a portable communication terminal, and particularly (though not exclusively) a portable multimedia communications terminal.

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Background of the Invention

In the field of this invention, it is known that users of portable terminals such as hand-held computers or 15 personal digital assistants (PDAs), and portable communication devices want these devices to be physically small. This makes them easy to carry. However, the users prefer a large area for the keypad, display etc., when the device is in use. In addition, for some devices the 20 user wants to be able to add extra functionality by adding modules to the portable communication device.

One famous portable product that balances the need for compactness for storage with the need for increased size 25 for usability is the Swiss Army knife. An equally famous example of a modular product is the LEGO product line, which has expanded into electronics in recent years. However, neither product type offers a portable multimedia communication device suitable for everyday 30 use.

There are modular solutions for communication products to add functionality - such as the clipOn (trade mark) Organizer for the Motorola (trade mark) StarTAC (trade mark) phone or the Eyemode (trade mark) digital camera

5 or other modules for Handspring (trade mark) hand-held computer devices. An Ericsson (trade mark) conceptual phone has also been shown that splits into two and fans but this is believed to be non-modular.

10 However, these approaches have the disadvantage(s) that the small size of a portable terminal such as a portable communication device can make it hard to use (for example, very small screens and very small keyboards), frequently resulting in a compromise being made between

15 having a small device for ease of carrying and having a larger device for ease of use.

Adding new components to portable devices frequently means that each component has to have its own power supply and interconnect cable. The extra components make the total system bulkier and heavier, and can also lead to power management problems.

20 The StarTAC and Handspring 'solutions' allow the main module to have only one module attached at any one time, thus limiting flexibility to the user. In addition, the ability to reduce the size for carrying can be minimal or nonexistent.

A need therefore exists for a modular system for a portable multimedia communications terminal wherein the abovementioned disadvantage(s) may be alleviated.

5 Statement of Invention

In accordance with a first aspect of the present invention there is provided a modular system for a portable communication terminal as claimed in claim 1.

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In accordance with a second aspect of the present invention there is provided a modular system for a portable communication terminal as claimed in claim 11.

15 In accordance with a third aspect of the present invention there is provided a module for use in a modular system for a portable communication terminal as claimed in claim 12.

20 Brief Description of the Drawings

One modular system for a portable multimedia communications terminal incorporating the present invention will now be described, by way of example only, 25 with reference to the accompanying drawings, in which:

FIG. 1 shows a top view of the portable multimedia communications terminal system when folded up or with no modules attached, and illustrates an earpiece which may 30 be detachably attached thereto;

FIG. 2 shows a top view of the portable multimedia communications terminal system of FIG. 1 with an additional attached module "swung out" or rotated about a pivot point from the back of the main, top-most module;

5

FIG. 3 shows a top view of the portable multimedia communications terminal system of FIG. 1 configured with the main module and four other extended, attached modules;

10

FIG. 4 shows a side view of the portable multimedia communications terminal system in the configuration of FIG. 3, illustrating modules of various thicknesses;

15

FIG. 5 shows a top view of the portable multimedia communications terminal system of FIG. 1, with additional attached keyboard modules having two parts "swung out" or rotated about a pivot point from the back of the main, top-most module; and

20

FIG. 6 shows an example mechanism as cross-sectional views of modules of the system having respectively female and male formations which co-operate in holding together the modules detachably and rotatably.

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#### Description of Preferred Embodiments

Briefly stated, this invention is based on a form factor concept that allows a small compact 'footprint' for

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carrying and storage while allowing a much larger and versatile area when the device is in use, and utilises

modularity as part of the form factor concept to increase the flexibility of use and to allow customisation. In a preferred form, modules of a portable communication terminal can be chained or fanned together in any 5 combination. It is thought that this invention will be of particular benefit in multimedia communications.

Referring firstly to FIG. 1, a modular system for a portable communication terminal in the form of a portable 10 communication device 100 has a main module 110 that is generally planar and has a screen 120 and some dedicated hard-wired buttons 130 for basic input. The terminal system 100 comes with a Bluetooth (trade mark) earpiece 140 that performs audio input/output for the device.

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As will be explained in greater detail below, additional modules can be attached to the back of this main module 110 and rotated out therefrom (in a plane parallel to that of the main module 110) for use as desired. The 20 mechanism used to allow the modules to be detachably attached and rotated in parallel planes will be described in greater detail below. As will be explained, the detachable and rotatable attachment mechanism also allows electrical data signals and power to be communicated 25 between the modules.

For example, as shown in FIG. 2, a digital camera module 150 could be detachably attached and swivelled out for use as necessary.

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It will be appreciated that the device 100 will appear the same in top view, as shown in FIG. 1, whether no modules are attached or attached modules are folded up (i.e., rotated behind the main module 110). Thus, when 5 the device is folded up, only the main module controls are visible to the user (as shown in FIG. 1).

It will also be understood that the earpiece 140 can be attached to the main module (e.g., for secure storage 10 with the rest of the terminal system) in the same way as the other modules (with the same detachable attachment mechanism described below).

The same basic concept of stacking and swivelling can be 15 used to attach a number of modules together to enable the device to perform many different functions at the same time. For example, the main module 110 may have a digital camera 150, keyboard 160 and 170, and two other modules (such as a minidisc player 180 and an additional module 20 190) attached all at once, as shown in FIG. 3. It is possible to connect modules to pivot points at either end of the modules (see later for details). Each module has identical connection points and an identical connection mechanism to allow 'chains' or 'fans' to be made in any 25 combination as can be seen in FIG. 3.

FIG. 3 shows the 'chaining' that is possible when the modules are joined end-to-end around more than one pivot point (i.e., the two modules in the bottom left of the 30 figure). In addition, the left-hand and right-hand keyboard modules 160 and 170 in FIG. 3 show how the

modules can 'fan' out from a single pivot point. As stated above, these two types of configuration can be used in any combination.

- 5 It will also be understood that the modules can have different thicknesses. The side view in FIG. 4 shows how the device would look with several modules linked together (as in FIG. 3) and rotated out for use.
- 10 If desired, not all configurations of the device need to be capable of being folded up into the configuration as shown in FIG. 1, without detaching some modules. For example, in FIG. 3 and FIG. 4 the digital camera module 150 would need to be removed in order to fold up the rest
- 15 of the modules. However, the unlinked digital camera module would still be able to stack with the others for storage because it is the same size and shape.  
Alternatively, if the modules were stored in a carrying case, then any unlinked modules would fit into it. As
- 20 will be explained below, the detach or release mechanism for the modules is simple to use so that it is easy to remove modules when required.

- 25 FIG. 5 shows the device 100 with only the left-hand and right-hand keyboard modules 160 and 170 fanned or rotated out for use. The keyboard modules 160 and 170 act as a single keyboard which fans out into two pieces, one for the left hand and one for the right. Each user can position the two halves of the keyboard anywhere along
- 30 the arrows 162 and 172 shown, for the angle that best suits their own typing style. In addition, individual

keys of each keyboard module are carried on discs 165 and 175 respectively, which can also be rotated (e.g., as shown by the arrow 168) within the plane of the respective keyboard module to further customise the 5 typing angle for the user.

As mentioned above, a mechanism is required to connect the modules together both electrically and mechanically. Mechanically this can be achieved, for example, as shown 10 in FIG. 6.

As shown, each module (except the main module) has a circular "male" connector 300, with one large, notched disc 310 and a concentric smaller disc 320. Each module 15 has two triangular "female" connectors 330 (with respective assemblies of lever 340, latch 350 and spring 360) at opposite ends of the opposite surface.

Two modules are joined by their mating connectors being 20 clicked together (step 1). The spring-loaded retention/release latch 340 holds the large disc 310 in place (the latch 350 locating and engaging in the disc's notch) to lock the modules together and the small disc rotates in the large disc, thus allowing the module to 25 rotate (step 2). When the retention/release lever 340 is pushed, the latch is moved out of engagement with the large disc's notch, releasing the large disc and allowing the modules to be separated (step 3).

30 Electrical connection between modules may, for example, be made by a 'slip' ring arrangement using the small disc

above sub-divided into three separate concentric electrical conducting rings. Assuming three connections are used, then these may be for power, earth and data (allowing serial data transfer such as, for example,

5 Ethernet-type data transfer). Any other number of concentric electrical connections could be used but this would be implementation specific.

10 Optionally the system could also include a variety of "dummy" or "container" modules to hold smaller modules in place. For example, an 'mp3' module might be relatively much smaller and be able to be used without the rest of the system, but might slot into a larger "container" module to make it compatible with the whole system when

15 the user wants to use it with other modules.

The modules themselves could have a wide variety of functions. The main module (with earpiece) would act as a wireless voice, image and data communication device.

20 Other possible modules include a digital still and/or video camera, alpha/numeric keyboard/keypad, minidisc/mp3 player, GPS module, improved performance computer, extra memory, application software, extra battery pack, FM radio, scanner, printer, and games module with joystick.

25 Another possible module would be a large screen (which could be four times the size of a normal module if a flexible display material were used). Some of these modules can have their own battery so they can be used independently from the rest of the modules. The device

30 could also come with various supports to help prop up the

screen for better viewing, stabilise the keyboard for more comfortable typing, and so on.

It will be appreciated that since the modules can share

5 power, the power failure of one module does not cause the failure of the whole system. The module power supplies may be recharged individually, in clusters, or as a complete device through a suitable charging pack.

10 It will also be appreciated that there is the option for modules to operate away from the 'main' module, either individually or as part of a separate module arrangement.

In conclusion, it will be understood that the modular

15 system for a portable multimedia communications terminal described above provides the following advantages:

(i) the combination of stacking and swivelling allows the composite device to have both compactness for portability and more "real estate" for usability;

20 (ii) modules can be chained and/or fanned in any combination to suit the user's needs or requirements;

(iii) the user can choose which functionality the communication device will need to have and choose the modules, to purchase or to take out for the day,

25 accordingly; and

(iv) the keyboard modules 'fan' out to give a larger alpha/numeric keyboard/keypad size to increase usability.

Claims

1. A modular system for a portable communication terminal (100), comprising:

5       a first module (110) having a first formation (330);  
and

at least one second module (150, 160, 170) having a second formation (310, 320) thereon,

10      the first and second formations being arranged to co-operate so as to:

detachably hold the modules together; and  
allow the modules to rotate with respect to each other.

15

2. The modular system of claim 1 wherein the first and second formations are arranged to co-operate so as to electrically connect the modules.

20    3. The modular system of claim 1 or 2 wherein the first and second formations are arranged to co-operate so as to allow the modules to rotate in parallel planes with respect to each other.

25    4. The modular system of claim 1, 2 or 3 wherein the terminal (100) is a multimedia communication terminal.

30    5. The modular multimedia communication terminal system of claim 4 wherein the first module (110) is a main module providing core functionality, and the at least one second module comprises a keyboard module (160, 170).

6. The modular multimedia communication terminal system  
of claim 5 wherein the keyboard module comprises a left-  
hand keyboard module (160) and a right-hand keyboard  
5 module (170).

7. The modular multimedia communication terminal system  
of claim 5 or 6 wherein the keyboard module comprises a  
keypad (165, 175) which is rotatable within the module.

10 8. The modular multimedia communication terminal system  
of claim 4, 5, 6 or 7 wherein the first module is a main  
module (110) providing core functionality, and the at  
least one second module comprises at least one module  
15 selected from:

digital still camera (150);  
video camera;  
alpha/numeric keyboard/keypad (160, 170);  
minidisc player (180);  
20 mp3 player;  
GPS module;  
improved performance computer;  
additional memory;  
application software;  
25 extra battery pack;  
FM radio receiver;  
scanner;  
printer;  
games module with joystick; and  
30 display screen.

9. The modular system of any preceding claim wherein the first formation comprises latch means (340, 350, 360) for releasably engaging a complementary formation, and the second formation comprises a complementary formation

5 (310) for releasable engagement by the latch means.

10. The modular system of claim 9 wherein the latch means comprises a latched spring lever arrangement (340, 350, 360), and the second formation comprises:

10 a first disc (310) having a notch therein for engagement by the latch means; and

a second disc (320) substantially concentric with the first disc and rotatable with respect thereto.

15 11. A modular system for a portable communication terminal (100), comprising:

a first module (110) having a first formation (330);

at least one second module (160) having a second formation (310, 320) and a first formation (330)

20 thereon; and

a third module (180) having a second formation (310, 320) and a first formation (330) thereon,

the first and second formations being arranged to co-operate so as to:

25 detachably hold the modules together, the second module (160) being detachably held to the first module (110), and the third module (180) being detachably held to the second module (160); and

allow the modules to rotate with respect to each

30 other.

12. A module (110, 140, 150, 160, 170, 180, 190) for use in a modular system for a portable communication terminal (100), the module having a first formation (330) arranged to co-operate with a second formation (310, 320) on at 5 least one second module, whereby the first and second formations:

detachably hold the modules together; and  
allow the modules to rotate with respect to each other.

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13. The module of claim 12 wherein the first and second formations are arranged to co-operate so as to electrically connect the modules.

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14. The module of claim 12 or 13 wherein the first and second formations are arranged to co-operate so as to allow the modules to rotate in parallel planes with respect to each other.

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15. The module of claim 12, 13 or 14 wherein the terminal (100) is a multimedia communication terminal.

16. The module of claim 12, 13, 14 or 15 wherein the module is selected from:

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main module (110) providing core functionality;  
digital still camera (150);  
video camera;  
keyboard (160, 170);  
minidisc player (180);

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mp3 player;  
GPS module;

improved performance computer;  
additional memory;  
application software;  
extra battery pack;  
5 FM radio receiver;  
scanner;  
printer;  
games module with joystick; and  
display screen.

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17. The module of claim 16 wherein the keyboard module (160, 170) comprises a left-hand keyboard module (160) and a right-hand keyboard module (170).
- 15 18. The modular multimedia communication terminal system of claim 16 or 17 wherein the keyboard module comprises a keypad (165, 175) which is rotatable within the module.
19. The module of any one of claims 12 to 18 wherein the 20 first formation comprises latch means (340, 350, 360) for releasably engaging a complementary formation, and the second formation comprises a complementary formation (310) for releasable engagement by the latch means.
- 25 20. The modular system of claim 19 wherein the latch means comprises a latched spring lever arrangement (340, 350, 360), and the second formation comprises:  
a first disc (310) having a notch therein for engagement by the latch means; and  
30 a second disc (320) substantially concentric with the first disc and rotatable with respect thereto.

21. The modular system for a portable communication terminal substantially as hereinbefore described with reference to the accompanying drawings.

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22. A module for use in a modular system for a portable communication terminal substantially as hereinbefore described with reference to the accompanying drawings.



Application No: GB 0111274.7  
Claims searched: ALL

Examiner: Paul Marshall  
Date of search: 22 January 2002

## Patents Act 1977

### Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T):

Int Cl (Ed.7):

Other: Online: EPODOC, WPI, JAPIO

#### Documents considered to be relevant:

| Category | Identity of document and relevant passage                | Relevant to claims   |
|----------|--|----------------------|
| X        | GB 2315186 A (Motorola Inc.) See figures 4-6 and 12-13   | 1-5, 8-10, 12-16, 19 |
| A        | JP 3280190 (Tokyo Electric Co. ltd.) See figures 2 and 3 | -                    |

|   |   |   |  |
|---|---|---|--|
| X | Document indicating lack of novelty or inventive step   | A | Document indicating technological background and/or state of the art.  |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention.          |
| & | Member of the same patent family  | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |